

Application No. 09/595,052
Response to Office Action

Customer No. 01933

Amendments to the Specification:

Please amend the paragraph at page 2, lines 9-22 as follows:

In the image forming apparatus provided with the recording head of this type, a character/line image is reproduced as a binary image simply corresponding to the resolution of the head. A graphic/photograph image is reproduced as a binary image by a halftone processing such as an ordered dither method or an error diffusion method. In the halftone processing, it is difficult to both maintain a high resolution and reproduce a high tone level. In case of the ordered dither processing using the same threshold matrix repeatedly, in particular, resolution and tone ~~property~~ properties are contradicting ~~property~~ properties. The halftone processing is also used for color characters, shading colors and the like.

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Please amend the paragraph at page 12, line 19 to page 13,
line 3 as follows:

Furthermore, as for the formation of a color image, the tone reproduction characteristic comparable to the quality of a photograph including a highlight ~~is~~ becomes increasingly important in recent color printers. The reproduction of tones capable of further ~~enhancing~~ reducing graininess is one of the most important technical challenges among others. Graininess indicates the ~~inconspicuousness of dots or rough feeling~~ degree of roughness in a printed image. A good graininess image indicates an image which tones change uniformly or smoothly and a bad graininess image indicates an image having conspicuous dots or roughness.

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Please amend the paragraph at page 13, lines 4-13 as follows:

As a technique for satisfying the graininess, there is proposed a method of ~~enhancing~~ reducing the graininess of a highlight using thin ink colors, e.g., light cyan and light magenta beside standard four ink colors of C (cyan), M (magenta), Y (yellow) and K (black). With this method, however, the number of recording heads and driving mechanisms increase proportionately to the number of added ink colors. If a recording head has the same number of nozzles as that of pixels on a line per color, this disadvantageously leads to cost hike.

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Please amend the paragraph at page 27, lines 7-18 as follows:

The halftone processing section 24 constitutes the important parts of the present invention. In this embodiment, description will be given to a case where the halftone processing section 24 conducts a halftone processing to input tone image data of, for example, 8 bits and 256 tones (0: white, 255: black) to convert the image data into data having colors each represented by 3 bits and 8 tones (0: white, 7: black). It is noted that the numbers of input and output tones should not be limited to the above numbers. It would be easily construed from the following description that the number of tones can be ~~changed to~~ arbitrary ~~one~~.

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Please amend the paragraph at page 33, lines 22-26 as follows:

Now, description will be given to a method of realizing optimum image reproduction for a printer by combining a sequences of a plurality of threshold planes. For brevity, the threshold sequence shown in FIG. 7A will be described.

Please amend the paragraph at page 36, line 22 to page 37, line 3 as follows:

If so, neighboring pixels overlap with one ~~other~~ another in the sub-scan direction of a printed image and deep stripes occur or neighboring pixels are away from one another to thereby generate white stripes. In the low tone part in which neighboring dots are originally distant, these stripes are relatively inconspicuous. With the dot size in middle to high tone parts in which neighboring dots almost contact with one another, such stripes are most conspicuous.

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Please amend the paragraph at page 37, lines 4-19 as follows:

Further, if the size of the dot of the maximum tone level 7 is set to at least completely cover a square pixel corresponding to the resolution, dots of respective tone levels have the characteristics shown in FIG. 10. FIG. 10 shows the result of measuring density while the dots of the same sizes corresponding to the respective tone levels are printed on the entire paper sheet. The density characteristics with respect to the tone levels ~~is~~ are referred to as "basic tone characteristics". As can be seen from FIG. 10, the density difference d1 from the density at a tone level 0 to that at tone level 1 is larger than that between other neighboring tone levels such as d2. Therefore, the low tone parts, quite important to reproduce tones, tend to have normally a large density change and low tone resolution.

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Please amend the paragraph at page 43, line 24 to page 44,
line 8 as follows:

The coupling strength is preferably set optimum according to printing accuracy by changing the rate of k_i and k_j as shown in FIGS. 13A to 13C. FIG. 13A shows a case where $k_i = k_j$ and thresholds are arranged isotropically. That is, the thresholds having similar size are arranged without directivity. FIG. 13B shows a case where $k_i < k_j$ and thresholds are arranged anisotropically in main scan direction. That is, thresholds having similar sizes are arranged in main scan direction. FIG. 13C shows that k_i is far larger than k_j and that thresholds are arranged further anisotropically in main scan direction.

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Please amend the paragraph at page 57, line 22 to page 58,
line 7 as follows:

Thus, the dots in the low tone part which are very important factors for the reproduction of ~~tons~~ tones in the printer can be made inconspicuous and the types of diameters of dots are increased in the middle to high tone parts in which unevenness of density and stripes tend to be conspicuous, to thereby make unevenness of density and stripes inconspicuous. Further, unlike a case where thresholds are arranged at random, thresholds on the respective planes can be automatically obtained from a reference threshold array because of the correlation among the respective threshold planes, so that simpler hardware configuration can be expected.